

CLAIMS

1. A multi-axis interferometer comprising an optically transmissive monolith having a multiplexer portion and a beam splitter portion,

said multiplexer portion being configured to split an input beam into a corresponding plurality of intermediate beams, each of said intermediate beams being directed toward said beam splitter portion through a corresponding output port of said multiplexer portion;

said beam splitter portion being configured to separate said intermediate beam into a measurement component and a reference component.
2. The interferometer of claim 1, wherein said multiplexer portion comprises:

a first interior face, and

a second interior face opposite to said first interior face, said second interior face having disposed thereon an output port.
3. The interferometer of claim 2, wherein said output port comprises a beam steering element.
4. The interferometer of claim 3, wherein said beam steering element is configured to refract a beam incident from said first interior face into an intermediate beam normal to said second interior face.
5. The interferometer of claim 3, wherein said beam steering element comprises a diffraction grating.
6. The interferometer of claim 3, wherein said beam steering element comprises a volume of material having an index of refraction selected to refract said beam incident from said first interior face into said intermediate beam normal to said second interior face.
7. The interferometer of claim 2, wherein said plurality of partially transmissive refractors have transmissivities selected such that said each of said intermediate

beams carries substantially the same power as any other intermediate beam.

8. The interferometer of claim 2, wherein said multiplexer further comprises a reflector disposed to redirect said input beam toward said second interior face at a grazing angle relative to said second interior face.

9. The interferometer of claim 2, wherein said reflector comprises an angled portion of said first face.

10. The interferometer of claim 1, further comprising a corner reflector in optical communication with said output port and said beam splitter portion, said corner reflector being configured to direct said intermediate beam into said beam splitter portion.

11. The interferometer of claim 1, wherein said beam splitter portion comprises a beam-splitting plane that transmits light having a first polarization and reflects light having a polarization other than said first polarization.

12. The interferometer of claim 1, further comprising a first polarization transformer in optical communication with a reference face of said beam splitter portion for intercepting said portion of said intermediate beam directed toward a reference reflector.

13. The interferometer of claim 12, further comprising a second polarization transformer in optical communication with a measurement face of said beam splitter portion for intercepting

14. A multi-axis interferometer comprising:

an optically transparent monolith having a multiplexing layer that divides an input beam into a plurality of intermediate beams and a beam splitting layer that directs a measurement component of each of said intermediate beams along a measurement path, and a reference component of each of said intermediate beams along a reference path;

an output coupler in optical communication with said multiplexing layer and

- said beam splitting layer.
- 15.** The multi-axis interferometer of claim **14**, wherein said multiplexing layer comprises
- a first reflector,
- a second reflector opposite said first reflector; and
- a beam steering facet oriented to direct said input beam toward said second reflector at a grazing angle.
- 16.** The multi-axis interferometer of claim **15**, wherein said beam steering facet comprises an angled portion of said first reflector.
- 17.** The multi-axis interferometer of claim **14**, wherein said output coupler comprises a partially transmissive medium disposed to intercept said input beam.
- 18.** The interferometer of claim **17**, wherein said output coupler further comprises a beam steering element for altering a direction of said intermediate beam.
- 19.** The interferometer of claim **14**, wherein said output coupler further comprises a reflector disposed to direct light from said multiplexing layer to said beam splitting layer.
- 20.** A multi-axis interferometer comprising:
- a beam multiplexer for forming a plurality of intermediate beams from an input beam;
- a beam splitter integral with said beam multiplexer for directing a measurement component of said intermediate beam along a measurement path having a first path length and a reference path having a second path length;
- an output coupler providing optical communication between said beam multiplexer and said beam splitter.